Space Weather Forecast

Issued on Wednesday, 22 March 2023 at 01:25 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

---

Space Weather Forecast Headline: Chance of Moderate class flares. G1-G2 Minor/Moderate storms likely day 2 (23rd).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low with only common class flares, the strongest of which was from one of the larger sunspots in the southeast disc. There are six sunspot regions on the Earth-facing disc, five of which are numbered. The most complex region is a moderately sized one in the southeast disc, due to a weak opposite polarity spot near its largest spot, perhaps suggesting some potential instability and increased flare risk. The other regions are generally either stable or declining, with simple magnetic structures.

There are a number of filaments on the Earth-facing disc, which are lines of material held together by the Suns magnetic field. These have been the source of a few coronal mass ejections (CMEs) in the last few days as the Sun's magnetic field changes and ejects this material. However, these have generally been off the Earth-Sun line with no Earth-directed CMEs observed in the last 24 hours. Confidence is Low, however, as the availability of imagery for analysis is currently limited.

Solar Wind / Geomagnetic Activity: The solar wind speed showed the arrival of the fast winds from a coronal hole. This rose from around 400km/s to peak at elevated levels of 500-550 km/s by the end of the period. The total magnetic field strength was weak to moderate with the north-south component also similar in strength but more often pointed in a positive direction (northward). The phi angle remained predominately positive (away from the Sun). Geomagnetic activity was Quiet to Unsettled (Kp1-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is just above background levels after the S1/Minor Solar Radiation Storm that occurred last week, however this is still well below the S1/Minor Storm level and now declining back towards background.

Four-Day Space Weather Forecast Summary

Solar Activity: Generally Low Solar activity is expected, with a chance of isolated Moderate flares. The main flare risk is currently from the more complex region in the southeast disc or from any of the regions rotating onto the disc form the far-side.

Solar Wind / Geomagnetic Activity: The CME from the southwest disc on the 20 March has a low chance of glancing Earth early on day 2 (23rd). A second CME a filament lifting from the northeast of the disc on the 20 March may also give a glancing arrival around midday on day 2. Otherwise current elevated winds from the recent coronal hole sourced enhancement are expected to ease slightly day 1 (22nd) before a transition into a stronger fast wind region occurs day 2 (23rd). These elevated winds are expected to continue day 3 (24th), perhaps easing day 4 (25th). Geomagnetic activity is expected to be Quiet with Unsettled intervals for much of day 1, increasing to Unsettled to Active, with G1/Minor Storm intervals likely day 2 due to the combination of fast winds and CME effects. Activity gradually easing day 3 and 4, to be mainly

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.

Met Office Space Weather Forecast

Quiet with isolated Unsettled intervals by the end of the period.

Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to continue very gradually and erratically declining towards background with only a very slight chance of further enhancements given any significant flares occur.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	70	40	5
Strong	G3	No	1	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	30	30	30	30
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	2	2	2	2
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.